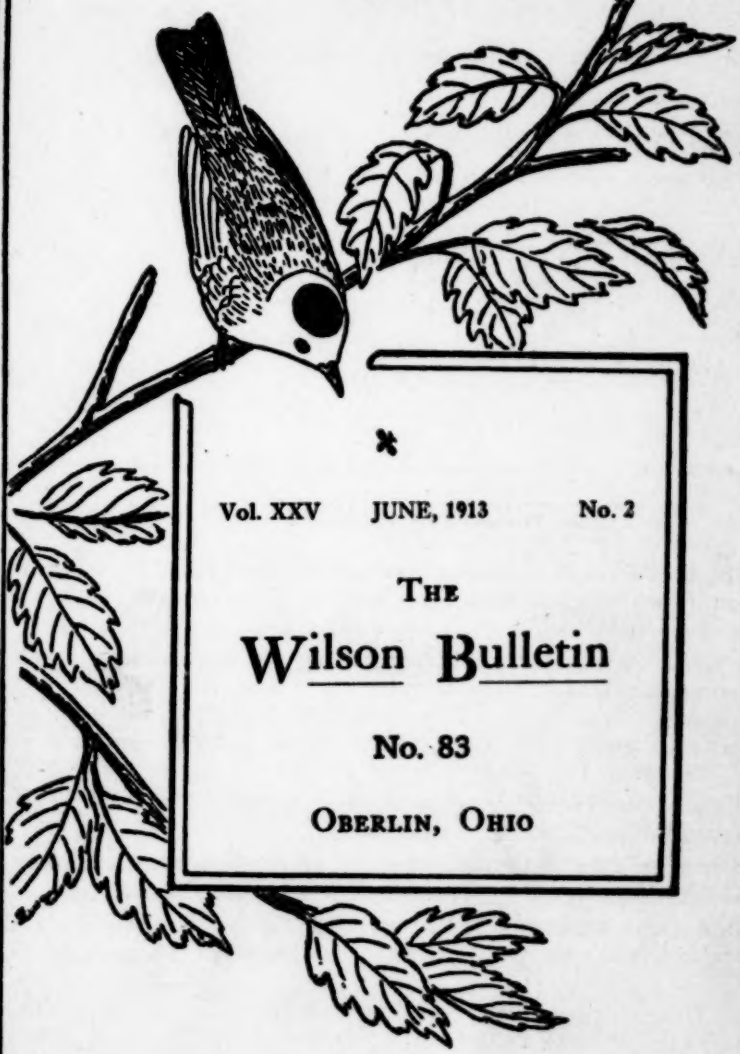
JUN 26 1913



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A STUDY OF THE NESTING BEHAVIOR OF THE YELLOW WARBLER (*Dendroica æstiva æstiva*).

BY HARRY C. BIGGLESTONE.

INTRODUCTION.

The data upon which this paper is based was obtained during the summer session of 1912, of the Macbride Lakeside Laboratory, on Lake Okoboji, Iowa, to the director of which I wish to express my obligation. With the exception of about six hours, the nest was constantly under observation during the feeding hours of the day, from 4:15 p. m. on July 2 until the last nestling left the nest on July 12 at 6:28 a. m.

I wish especially to thank Prof. T. C. Stephens for suggesting to me this piece of work, and also for assistance in bringing it to completion. I owe my thanks to Mr. Ira N. Gabrielson, from whom I obtained many valuable ideas for carrying on the observations. It would have been impossible for one individual to carry out the continuous program involved in this work. Relief at meal time and other periods of the day was freely given by students of the laboratory, and for this I am under obligation to the following: Miss Hudson, Miss Nellie D. Fisher, Messrs. H. S. Doty, G. A. Muilenburg, J. Weaver, P. J. Kruse, D. H. Boot, M. O. Insko, A. H. Schatz, C. H. Farr, and Prof. A. O. Thomas.

The nest of this yellow warbler, *Dendroica æstiva æstiva* (Gmelin), was built about two feet from the ground in a buck bush, or wolfberry bush, (*Symphoricarpos occidentalis* Hook), which was located on the south slope of a narrow, winding ravine. In the vicinity of the nest the oak trees were few and scattered as compared to the dense wood farther down the ravine. The soil was black and fairly moist, crumbling very readily. A dense vegetation grew on the slopes and in the bottom of the ravine. The plants named in the following list were found growing within a radius of fifaeen feet from the nest: House Mint (*Monarda mollis* L.).[1] Tall Meadow Reu (*Thalictrum polygamum* Muhl.). Cup Plant (*Silphium perfoliatum* L.). True Solomon's Seal (*Polygonatum commutatum* (R. & S.) Dietr.). False Solomon's Seal (*Smilacina racemosa* (L.) Desf.). Virginia Creeper (*Psedera quinquefolia* (L.) Greene). Poison Ivy (*Rhus toxicodendron* L.). Plum Tree (*Prunus sp.*). Sun Flower (*Heliopsis scabra* Dunal). Strawberry (*Fragaria virginiana* Duchesne). Meadow Parsnip (*Thaspium aureum* Nutt). *Anemone cylindrica* Gray. Golden Rod, Stinging Nettle, Ash (seedling), and a grass.

The nest was found on June 21, and was well concealed and shaded by the neighboring plants. It was built into a fork of the bush and anchored with some white cord which was twined around the supports. The foundation of the nest was built of interwoven coarse straws, and was lined inside with soft down mixed with hair.

There were three eggs in the nest when first seen on June 21. The nest was visited shortly before noon on the following day and it was then found that the fourth and last egg had been laid. The nest was visited daily, with one exception, from this time on until the hatching, when the regular observations began.

On June 28 the blind was erected south from the nest at a distance of about two rods. On each succeeding day, except

[1] I am indebted to Mr. H. S. Doty for the identification of the plants in this list.

one, the blind was moved a little nearer to the nest in order to gradually accustom the birds to its presence. Upon visiting the nest on the morning of July 2, at 7:30, it was found that three of the eggs had hatched, and the young, evidently, were but a few hours old. The blind was now brought to within two feet of the nest; during this operation the parents continued to feed the nestlings. At 4:15 p. m. of the same day the blind was entered and observations began, which were continued as described elsewhere. On July 5 the blind was moved six or seven inches nearer the nest so as to get a better view of the feedings and distinguish the young.

INCUBATION PERIOD.

The last egg hatched at 5:30 a. m. on July 3; while the fourth egg was first observed in the nest at 11:30 a. m. on June 22. Between these two dates ten days and six hours are counted. It is taken for granted that the egg was laid earlier in the day, perhaps, between four and six o'clock. By adding this calculated six hours, the incubation period would appear to be just about even eleven days.

HATCHING.

At about 5:30 a. m. on July 3 the writer was attracted by a peculiar rolling motion of the egg in the nest, and noticed upon closer observation, that the shell bulged out in a ring around the middle or a little nearer the smaller end; and soon it began to crack at this place. The egg raised on the small end, leaning against the side of the nest, and the young bird freed himself from the shell by a series of pushes and kicks by the head and feet, respectively. The head escaped from the larger part of the shell and the lower part of the body from the smaller end. The crown of the head and the median line of the back of the nestling were downy. This entire process covered a period of less than four minutes.

DISPOSAL OF THE SHELL.

The female, bringing a grasshopper, returned to the nest immediately after the hatching of the fourth egg. She fed

one of the nestlings and then picked up one-half of the shell, which she worked around in her bill, thus effecting its comminution. This part of the broken shell was then quickly swallowed. Soon the male returned and perched on the edge of the nest while the female in a similar manner broke up the other half of the shell, after which both birds devoured it. The parent birds then cleaned the nest by picking up and eating the smaller portions of scattered egg shell.

MARKING THE YOUNG.

There were three methods tried for marking the young, but only the last one was successful. At about eleven o'clock on July 3 the attempt was made to mark the young with aniline dyes, but it seemed impossible to make them take hold. Though it must be acknowledged that this plan may not have been given a fair trial. Then again a little after one o'clock on July 5, an effort was made to mark the nestlings with colored adhesive papers, but these would not stick very well to the downy skin of the birds, and when one did so the female picked it off upon her return to the nest. On the evening of July 6 the last method was tried, that of tying different colored strings to the legs of the young. In this way the largest bird was marked white, the next blue, and the third in size and activity red.

There are a few explanations which should be made at this time. On July 4 one of the nestlings was lost from the nest and cannot be accounted for, as the disappearance was not observed. This occurred before the marking of the young, and the absence of one would less likely be noticed.

On July 7 the bush, in which the nest was located, was strengthened by being tied to an upright driven into the ground.

In reading the records of the days following July 8 and also the tables, it should be taken into consideration that the proceedings were abnormal, as the male left the care of the young entirely to the female.

FEEDING.

The feeding of the nestlings was carried on by both male and female parent birds. As is shown in Table I, during the first four full days of observation, the male bird made more feeding visits than did the female, but on the following day the female outworked the male in this respect. However, during the remaining days it was impossible to follow this comparison because the male discontinued all feeding visits on July 8, immediately following the snake incident.

TABLE I.

Showing exact periods of observation and totals of feeding visits of the parents by days.

Day	Time	Hours	Min.	m	f	Total
July 2	4:15 p. m.-7:40 p. m.....	3	25	21	24	45
July 3	4:20 a. m.-8:30 p. m.....	16	10	136	91	227
July 4	4:20 a. m.-8:30 p. m.....	16	10	106	94	200
July 5	4:15 a. m.-8:10 p. m.....	15	55	127	114	241
July 6	4:32 a. m.-7:35 p. m.....	15	3	151	131	282
July 7	4:10 a. m.-8:25 p. m.....	16	15	155	189	344
July 8	6:20 a. m.-8:48 p. m.....	14	28	117	161	278
July 9	6:30 a. m.-8:10 p. m.....	13	40	...	264	264
July 10	4:30 a. m.-8:47 p. m.....	16	17	...	221	221
July 11	4:25 a. m.-7:45 p. m.....	15	20	...	238	238
July 12	4:20 a. m.-6:30 a. m.....	2	10	...	33	33
Total	.....	144	53	813	1560	2373

During the first three or four days when the female was brooding, usually the male gave her the food, which she distributed to the nestlings. But there were times when the male ignored the outstretched bill of the female and fed the young himself. She would also, on some visits, move to one side of the nest and allow the male to feed the young. Again there were several times that the male gave part of the food to the female and then both the parent birds distributed their shares to the nestlings. On one occasion (visit No. 1584) the male fed a fly to one of the nestlings, but the female immediately took the fly from the young and ate it herself. When

the food was too large for the nestling to swallow, the parent bird sometimes pulled it out of the young bird's mouth and thrust it in again, repeating this process as many as three times, until the nestling swallowed it. On one visit (No. 336) both parent birds helped to push the food down the nestling's throat. Again if the young did not swallow the food, the parent took it and either broke or shook it into a mass so that it was then easily devoured. The worm brought at visit No. 641 was so large that the outline of it was seen through the skin of the neck of the nestling bird. There were times, also, when the young quarrelled over the food; for example at visit No. 272, two of the young grabbed the food and pulled back and forth until the larger one got it. The parent birds in feeding would also try one nestling and if it did not respond properly he would try another, and sometimes go back to the first one again. On July 10 at 12:36 the female brought some food and tried to feed red, but the nestling did not take it; then the female left and soon returned, but still red would not respond, so the female left the nest, carrying away the food. A very unusual performance occurred on visit No. 398, when the parent birds came to the nest carrying a large yellowish worm between them, which they broke into three pieces and fed to the young.

The identification of the food was very difficult because of its minuteness. Table II shows the distribution of food per day along with a somewhat indefinite classification. There were periods when the male and female brought the same kind of food during a number of consecutive visits, which may have been due to the fact that at times the parent birds traveled together while feeding, as was seen during a short observation. This was especially true of the green worms.

TABLE II.

Showing the distribution of food by days.

July	2		3		4		5		6		7		8		9	10	11	12	Total
	m	f	m	f	m	f	m	f	m	f	m	f	m	f	f	f	f	f	m & f
Unknown	10	12	18	14	15	9	28	18	32	3	29	21	25	15	9	16	48	9	331
Insects	..	..	19	11	31	23	37	17	26	20	48	63	28	32	55	83	54	6	553
Green Worms	4	5	60	33	28	22	29	27	52	55	44	40	24	47	84	63	39	3	659
Fly Forms	..	..	3	5	10	6	13	17	18	26	17	20	21	42	60	33	32	3	326
Worms	1	2	13	8	12	9	13	10	16	17	10	11	7	5	10	10	8	..	162
May Fly	..	..	..	..	..	4	4	3	4	3	10	15	3	14	41	23	16	7	147
Moths	1	3	14	7	3	2	4	1	1	2	3	3	1	4	17	16	17	4	103
Miller	..	..	..	..	..	2	..	1	..	..	..	2	7	12	8	4	35	4	75
Mosquito	..	..	..	2	4	5	4	5	4	1	1	9	..	3	5	..	22	..	65
Larvæ	..	..	..	..	5	4	..	..	4	3	..	..	2	..	8	..	..	..	26
Grasshopper	4	2	2	4	2	2	2	..	..	1	..	2	..	2	..	1	1	..	25
Spider	..	..	1	..	..	..	1	..	1	3	1	2	2	3	5	1	3	..	23
Ant	..	1	4	..	2	2	..	..	..	..	..	..	..	1	..	6	2	..	18
Grub	..	..	4	3	..	1	2	2	..	..	..	..	..	1	..	1	..	..	14
Beetle	..	..	..	..	2	1	..	..	1	..	..	..	..	..	1	2	1	..	8
Damsel Fly	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	1	4
Tree Hopper	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	2
Bee	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Total	20	25	138	87	114	92	137	101	159	134	163	190	120	182	303	261	279	37	2542

The time when feeding began in the morning varied within rather narrow limits. On one day it started at 4:29 a. m., and on another at 4:50 a. m. In the evening the earliest final feeding visit was at 7:56 p. m., except one rainy evening, when the female started brooding at 7:36. The latest final feeding visit was at 8:04 p. m. The average feeding period per day was fifteen hours and thirty minutes. (See Table I.)

Table III is prepared with the view of ascertaining whether the parent birds followed any system of rotation in distributing food to the young. However, there were three facts which prevented the collection of complete data, viz., a)the young birds were so small and delicate that they were not marked until the nestling period was nearly half gone, b) the early death of two of the young, c) and the unusual behavior of the male after the snake incident. No plan could be discovered which they seemed to follow. At one time one nestling received the food as many as seventeen successive visits; at other times the feeding rotated from one to the other.

TABLE III.

Showing the distribution of the food to the different nestling birds by the two parents.

	July 6.		July 7.		July 8.		July 9.	July 10.	July 11.	July 12.	Total
	m.	f.	m.	f.	m.	f.	f.	f.	f.	f.	
Red	2	3	51	50	37	51	118	170	238	33	753
White ...	2	3	48	83	43	45					224
Blue	3	4	46	58	38	63	146	51			409
Total	7	10	150[1]	192[1]	118	159	266[1]	221	238	33	1397
Total for m. & f. per day...	17		345[2]		277		266[1]	221	238	33	1400

[1] Error in total, due to fact that it was impossible to determine which nestling received the feeding.

[2] And on one occasion both parents were present at the same moment and all three nestling were fed, but without determining by which parent, thus making the total 345.

After blue left the nest on July 10, the female seemed to take care of it, for many times she was seen to approach with food, but would dart into the weeds near by, and soon fly out with bill empty. She would also remain away from the nest for rather long periods at this time. For example, a period of twenty minutes elapsed between visits No. 2148 and No. 2149, and fourteen minutes between visits No. 2442 and No. 2443.

When the observations commenced the parent birds were feeding the young large food, such as insects and green worms. As described elsewhere the writer was present when the fourth egg hatched and is able to state that the food of this bird was not at all different from that which was being given to the rest of the nestlings, viz., green worms, grasshoppers, and other insects. At no time while the nest was under observation did the parents feed by regurgitation. It might be said that on visits Nos. 138, 440, 745, 769, and 798, one or other of the parents came to the nest with beak empty, so far as could be discerned. This parent then thrust its bill into the mouth and throat of one of the young birds, and then repeated the act on another. Then again on visits Nos. 751, 1059, and 1880, after the parent bird fed one of the nestlings, it put its apparently empty bill in the mouth of one of the other young. This behavior is not understood, but is not regarded as explainable on the assumption of regurgitative feeding, for the reason that it was long after hatching, and so irregular and infrequent.

BROODING.

Brooding was carried on entirely by the female, with one possible exception. On July 3 the observer, who was in the blind it the time, recorded that the male brooded for seven minutes. Since this is the only instance where such behavior on the part of the male was noted by any one, and because the writer observed on two occasions the male perched on the edge of the nest inspecting the young, once for a period of four minutes, it seems doubtful if the observer

employed the term brooding in the sense of sheltering the young from sun, wind or rain.

The female while on the nest usually sat facing the blind, but during rains and strong winds from the northwest she would face in that direction, occasionally glancing back at the blind.

The female was more careful in brooding the young during the first few days. She would stop for intervals throughout the day, while feeding, and brood the young. Her way of completely covering the brood was to fluff out the under coverts against the rim of the nest and bring the wings down, just inside, so as to effectually close the nest. As the young grew older and became larger, brooding also became more difficult. She experienced great difficulty in covering the young, for the nest was very much battered and misshapen, making a larger area to cover. The young were very active and there were times when the female would be contentedly brooding, while covering only the head of one nestling.

The female had different brooding attitudes for the varying circumstances. For protection against the cold of early morning she brooded in the manner described above, completely covering the young. Through the rains she brooded in much the same way as for cold, sheltering the young, so that after an unusually heavy downpour, the nest remained perfectly dry inside. During the heat of midday she usually stood in the nest with wings spread, shielding the young, but without shutting off the circulation of the air. On the contrary, at times she gently flapped her wings, as if fanning the young. During the strong winds she stood in the nest with wings outstretched, and leaned in the direction of the wind, so as to secure a delicate balance and at the same time keep the young in the nest.

Curves were plotted for the brooding period of each day in an effort to determine the variability in intensity of brooding throughout the day. But the results obtained were not satisfactory because of the different elements, such as rain,

wind, heat, cold, and nest location, which help to determine the brooding periods and the length of the same. Then many brooding periods were cut short by the male bringing food. But it was found that the brooding was more intense during the morning, and scattered throughout the rest of the day, according to the wind and the shading of the nest. The length of the brooding periods varied to a great extent, generally ranging from one minute up to between ten and twelve minutes. There were a few periods which exceeded this, the longest being thirty-two minutes, on the afternoon of July 5, and twenty-three and twenty-four minutes, on the afternoon of July 7. These long periods occurred when the nest was unprotected from the rays of the sun.

On July 7 the brooding periods became less in number and more scattered, the parent bird often departing with only a brief inspection. On the day following, and thereafter, brooding was discontinued entirely except during storm; while the brief inspections continued as before. As the young became stronger and walked around the nest, they stretched under the shadow of the leaves or even climbed into the branches.

These observations show a certain adaptability of behavior under natural environment. It was also shown that their behavior could be modified by artificial conditions. Between the hours of 1:00 p. m. and 5:00 p. m. the sun shown directly upon the nest, owing to the fact that the tall weeds which normally shaded the nest, were trampled down, in erecting the blind. During this time broad leaved burdocks were hung upon the guy ropes to throw a shadow over the nestlings. The female did not brood when the nest was thus shaded, unless there was a strong wind. Thus it would seem that the accident of location would have some bearing upon the intensity of brooding.

During the first days, the female began the brooding in the evening and was also on the nest in the morning before the feeding began. But on the last two days it was not seen which parent commenced the brooding in the evening or

which left the nest in the morning. It is not known whether the female brooded the entire night or whether the male relieved her, although there is no reason to suspect that such a change took place. The attitude of the female in sleep was to turn her head to the left, backwards and tuck the bill under the wing.

SANITATION.

The parent birds were very careful as to the cleanliness of the nest. The mother bird seemed to be more particular in this matter, for she did more than an equal share of work in keeping the nest clean.

From the beginning of the observation up to the snake incident the parent birds failed to catch the excreta sac only fifteen times. While, from this time on to the departure of the young she failed thirty-four times. But it must be borne in mind, that during this latter period the responsibility of caring for the young rested entirely upon the female. With this extra share of labor it was not surprising that she occasionally missed the excreta sac. This circumstance was, of course, an abnormal one. The records show that in many of these instances the excreta sac was voided "immediately following the departure of the female, after feeding one of the young." Several times when the sac fell to the ground the female picked it up and carried it away. Again the female made more feeding visits, *per young*, for, as the nestlings grew, they demanded more food. And, too, as the birds became older and larger their bodies often projected over the rim of the nest. Table IV shows the number of times each day that the excreta sac was not caught by the parent.

TABLE IV.

Showing the total number of times each day the excreta sac was not caught when voided.

July	2	3	4	5	6	7	8	9	10	11	12	Total
Not caught		4		1	6	2	3	5	10	15	3	49
Total number of excreta sacs	13	38	41	34	34	49	45	35	39	32	3	363

There was an unusual occurrence on July 8, when an excreta sac was left in the nest during two successive visits by each of the parent birds, although on the third visit the female carried it away. This instance is the more extraordinary, for there were times when one of the parent birds would be making a feeding visit and upon seeing an excreta sac in the nest, would promptly swallow the food so as to carry away the excreta at once.

While the nestlings were small, they were watched as far as was possible to ascertain whether the excreta was always taken from the same bird as fed. It was noted that this generally held true. Then after the young had been marked, more complete records were taken. Out of a total of one hundred and sixty-eight times, there were but five times recorded that the young voiding the excreta was not the one fed at that visit.

The excreta was usually eaten by the parents until July 5; on this day it was carried away a little over half of the time. And from then on, it was eaten only on eight occasions. Table V shows the disposal of the excreta and the total number of defecations.

TABLE V.

Showing by days the total number of excreta sacs, together with their disposal.

	Sex	July 2	3	4	5	6	7	8	9	10	11	12	Totals
Eaten	m	4	7	6	1								18
"	f	8	25	23	12	3	2	1		2[1]			76
Carried	m		6	8	9	10	20	17					70
"	f	1		4	12	21	25	27	34	36	27	2	189
Total.....		13	38	41	34	34	49[2]	45	34	38	27	2	363[3]

[1] One of the sacs of excreta was but partly eaten.
[2] On one trip the sex of the parent bird was not determined, and also once not noted whether excreta was carried away or eaten.
[3] Eight times the excreta sac fell to the ground and was neither carried away nor devoured by the parent birds, but are included in the final total.

Observations were taken as to what was done with the excreta when carried away and it was seen that the parent

bird flew to the limb of one of the nearby oak trees and either dropped the sac to the ground or deposited it on the bark of the tree. The bird then wiped the sides of its beak against the limb.

MISCELLANEOUS BEHAVIOR.

Throughout the period of observation, the female made close inspections of the nest. She was very careful of the young, through the heat, wind and rains, covering them well and keeping the interior of the nest dry. During the early days, if the young leaned out over the rim of the nest, she pulled them back or pecked them until they moved of their own accord.

The parent birds were very watchful of the young, and always present at the approach of any intruder. Several birds, such as the cowbirds, blue jay, wren, chickadee, brown thrasher, king bird, and blackbird, came into the neighborhood of the nest at different times. They were driven away either by the combined efforts of the male and female, or by one of the parents alone. The only bird which did not seem to arouse the warblers, and which was not driven out, was a catbird.

On July 8, shortly before noon, the observer in the blind caught sight of a small garter snake crawling along on the tops of the weeds, not more than a foot away from the nest. While the snake seemed to be directing its course aimlessly, yet it came nearer to the nest, and even rubbed against the bush containing the nest, a few inches beneath the latter. At this point the observer interfered, but failed to capture the intruder. In the meantime the parents were very greatly disturbed and afraid to return, notwithstanding the calls of the young birds. Five minutes after the snake had been driven away, the female returned to the nest with a miller. The male came almost at the same time with food.

Later in the same day another snake incident occurred, which terminated in a tragedy. The following account was

written up immediately after the incident by Miss Nellie D. Fisher, who was in the blind at the time:

"At 2:40 p. m. the male bird fed the young and immediately afterward the female flew close to and directly above the nest without stopping; this act being unusual I looked around closely and at the base of the bush in which the nest was located a garter snake[1] was seen lying partly coiled up. I watched it for about two minutes, not thinking it would harm the birds; then it began to move, and I took a large piece of stove wood, all that was at hand in shape of a weapon, and struck at the snake through the peep-hole in the tent. At once it began to show fight, and in so doing it came almost into the tent; but when nearly under it, turned and went up the stick, which had been put in place to strengthen the bush, passed over the nest to the farther side, took the larger bird, and at once started off with it. The nestling, in the meantime, made considerable noise. I ran out of the tent after it, and followed the noise a few feet to the northwest, near the plum tree, when the noise stopped. I looked around a short time and then returned to the blind and found the snake just below the nest with the bird in its mouth. With the same stick of stove wood the snake was killed. By this time the bird was dead. Meantime, the male and female were flying about, uttering loud angry calls, and flying close to the ground where the snake lay."

The following notes are taken from the field records:

"Before 6:00 p. m. observer laid dead bird on branch near the nest; female, after feeding, seized dead bird by the leg with her beak, then darted against the tent as if frightened; but soon returned and took its head, hopped backward and unbalanced it so it fell to the ground. She seemed afraid of it; but made little darts at it, pulling it away from the nest.

"The female flew down near dead bird with food and twit-

[1] I am indebted to Dr. Alexander G. Ruthven, of the University of Michigan Museum, for identifying the snake as *Thamnophis sirtalis parietalis* (Say). This particular specimen was not over twelve inches in length.

tered several times; after feeding young, she again flew down about in the bushes and even under the nest.

"About 5:42 p. m. the female flew near the dead bird with a mosquito.

"Male came into the bushes, no food left.

"For a time parents approach nest, chirp and twitter.

"Again female flew near dead bird."

Following the snake incident the female was much more careful in approaching the nest, being nervous and very easily frightened away by the slightest noise. The male stopped feeding and left the entire care of the two remaining nestlings to the female. This action on the part of the male may have been due to fear. He remained throughout the day in an oak tree to the right of the nest. The two parent birds occasionally called or sang to each other, while the male came down from the tree at the warning call of the female, usually to drive away some intruding bird.

There was a certain stereotyped method of approach by both the parent birds, which remained unchanged throughout the nestling period. The female alighted in the weeds at some little distance to the north of the nest and gradually approached the nest by hopping from weed to weed. Thus she concealed her actions from any passers by. She usually stopped for a moment and inspected the young. The male invariably came straight down from the oak tree to the right and perched on the edge of the nest with his back or right side to the blind. He fed in a hurry and left at once. This made it difficult at times to identify the food or see which nestling received it.

During the first few days, the nestlings threw up their heads, with bills open, both when the parents visited the nest and when there was no observable stimulus. At this time it seemed that all they lived for was food. After the eyes had opened, they became more attentive to the things happening around about them.

It had been noticed that the young birds threw up their heads, with bills open, when the parent birds reached the

nest, and also when a gust of wind moved the nest. On July 7 a simple experiment was carried on. And it was found that the nestlings threw up their heads for food at the snapping of fingers, scraping the pencil on the blind, a low whistle, or contact with the nest. This instinct was shown whenever the birds were artificially stimulated, but on July 8 it became modified. For, at this time, such a stimulus caused the response from one, or, possibly, two birds, or from none. As they grew they became more watchful and attentive, for they perceived the parent bird approaching with food at some little distance. On July 9 the young marked red opened its bill at the shutting of a farm-house door, and both red and blue opened their bills when the nest was moved by the wind. Then on July 10 red opened its bill at an artificial chirp. It seemed that this instinct lessened each day, from July 8 on, but still it was present to a certain degree when the nestlings left the nest.

During the first half of the nestling period, the parent birds evinced a peculiar habit of pecking the young, especially about the eyes. It would, perhaps, be hazardous to attempt an interpretation of this beyond suggesting that it might simply indicate an impatience on the part of the old birds for the eyes to open. The eyes of all three nestlings were open by the evening of July 5, or, approximately, within a period of three days and a half after hatching. After this pecking about the eyes ceased, though continued on the other parts of the body.

On several occasions one of the nestlings swallowed the end of a hair, which was used in constructing the nest. This caused the bird much distress, and also made it impossible for its food to be swallowed. When the female visited the nest, on such occasions, she picked up the hair and attempted to pull it out, sometimes flying in a semi-circle around the nest. This certainly could become a grave danger to the nestling bird, because in many cases the hair was quite securely fastened in the gullet, and might easily result in the dislodgement of the young from the nest.

On the afternoon of July 11 the one remaining nestling (red) left the nest several times for the twigs nearby, sometimes for shade, and at other times as if to leave, but it returned to the nest each time, as if not yet sure of its ability to travel. On several occasions during this behavior, the female stayed in the weeds near at hand, watching the young bird, as if to be of assistance when needed.

The following notes are taken from the field record:

"On the morning of July 12, at 4:22 a. m., the nestling awakened, stretched, flapped wings, and chirped for some time. Then settled down again and seemed very listless.

"At 5:15, red was on the west edge of the nest; at 5:30, red left the nest for nearby twigs; foot was caught but soon pulled it loose.

"Red went from twig to twig until it reached another bush at 5:24; here it stretched and preened. At 5:35, red turned around on the twig and then back again. At 5:41, crawled farther out, stood up twice, as if to go, and then settled down again.

"Female approached and called.

"At 6:05, red jumped farther down on the same twig, four to six inches lower. Tried to climb up a weed, but slid down to first landing.

"At 6:07, red flew to weed about one and one-half inches away, but went back again.

"Female departed.

"At 6:25, red moved to another part of the same twig.

"At 6:27, red jumped to a low clump of weeds, and so on to another, and then on to the ground, at 6:28.

"Then I removed the red string from the leg; while both male and female were near, calling and scolding.

"All during this period, while the nestling was leaving the nest, the female brought food."

SUMMARY.

1. The young in the nest were under observation for 144 hours and 53 minutes.

2. During this time the parents fed the nestlings 2373 times.

3. The incubation period for *Dendroica æstiva* is eleven days.

4. The egg shells are disposed of by being devoured by the parents.

5. This species does not feed its young by regurgitation at any period.

6. Brooding is carried on only by the female.

7. Intensity of brooding is due to a complexity of factors, including nest location.

8. The brooding instinct can be modified by artificial environment.

9. During the first half of the nestling period, the excreta sac is usually devoured, and carried away during the latter half.

10. The excreta sac is either dropped to the ground or deposited on the limb of a tree.

11. The parent birds have a stereotyped approach to the nest.

Sioux City, Iowa.

SOME RECORDS OF THE FEEDING OF NESTLINGS.

BY LYNDS JONES.

During the summer of 1912 two students made a number of studies of the feeding of nestlings, summaries of which I herewith present. These studies were made without the aid of a blind, because it was found possible to approach within a few feet of the nests without disturbing the parent birds in their feeding activities. It was also found that the sex of the birds could be determined positively, after noting each bird for the first few hours. This was done by noting the individualities of the two birds, and by the frequent singing of the male, either just before or just after he delivered the food.

FIELD SPARROW (*Spizella pusilla pusilla*)—Four Young.

Only the last two days of the nest life were noted. The time spent with this pair was 19 hours and 12 minutes. During that time 237 pieces of food were delivered and 31 excreta removed. The shortest time between feedings was one minute and the longest 21 minutes, the average being 10 minutes between feedings. If each of the four young were fed in regular rotation each received food once in 40 minutes. There were 154 Geometrid larvæ (104 green, 37 brown, 13 white), 45 grasshoppers, 24 moths, 3 scattering, and 11 unknown. There was no regularity apparent, either of the intervals between feedings or of the sort of food secured as regards the time of day. All of the birds left the nest in the early morning, and apparently at the same time. It was not certainly determined that they were frightened away by a horse, but that is likely. The male was not seen to bring any food, but he secured some occasionally and delivered it to the female. The food was secured within a radius of 50 yards of the nest, mostly from the grass of the orchard, but occasionally from the apple trees. The bird always approached the nest from the same direction, usually alighting on the ground within three yards of the nest and proceeding directly to it by hopping along the ground and entering the bunch of grass in which the nest was built by means of a short tunnel. Her approach with food was heralded by a low chip, to which the young responded by stretching their necks up and opening the mouth. There seemed to be no method to the feeding to make certain that each young bird had a fair share, but all seemed to be equally well fed, judging from their appearance. Most of the excreta was eaten by the old bird. It was not allowed to soil the nest.

SONG SPARROW (*Melospiza melodia melodia*)—Four.

This nest was placed in a bunch of weeds beneath a Baldwin apple tree, within six inches of the ground. The old birds were sometimes disturbed by a flock of young chickens. The nest was under observation for the first three days after

the young hatched, and during the last three days that they spent in the nest — a total of 35 hours and 31 minutes. The female was less shy and was more attentive to the young, the male more shy and would leave the nest immediately after feeding. He had the habit of perching upon a limb near the nest and singing after each feeding. Neither bird made any sound on approaching the nest. The female did the most of the brooding of the young, spending the greater part of the time on the nest for the first three days. During this time the male brought the food and delivered it to the female, who delivered it to the young.

The male made 158 visits, the female 119 visits to the nest during the period of observation, or 277 by both birds. The male carried away 44 excreta, the female 31, or 75 by both birds. The excreta was sometimes eaten, sometimes fastened to the limb of a tree. 300 pieces of food were brought. Of these 178 were Geometrid larvæ, 46 grasshoppers, 11 bugs, 3 moths, 31 unknown, and 31 times nothing was brought. There were an average of eight feedings an hour. This is an average of one feeding every 30 minutes for each of the four young. There was no regularity in the time between visits to the nest at any time of day. The duration of absence seemed to be determined wholly by the ability of the birds to find food. They ranged rather farther than the Field Sparrows did, but seemed to find the bulk of the food in the grass.

HOUSE WREN (*Troglodytes aëdon aëdon*).

This nest was located when the birds first carried nest material into the woodpecker's hole in a sycamore post in the south-east corner of the orchard. The nest was near the top of the post, about four feet from the ground. The hole was on the north side of the post. A barbed wire was fastened to the post just below the nest hole, and below the barbed wire the fence was of woven wire. A corn field with the ears in full silk occupied the ground just south of the nest, the five-acre orchard of apple trees north-west, while two

rods to the east there was an oat stubble and the unoccupied part of a cemetery, from which the grass had just been cut for hay.

The birds finished the nest in a week, the eggs were laid in another week, incubation consumed eleven days, and the birds left the nest nine days after hatching. It was not possible to learn the number of young without breaking the nest open, which was not done. It was supposed that there were seven young. They were hatched early on the morning of July 22 and left the nest about ten o'clock on July 31.

This family was under observation 65 hours and 4 minutes. On three days the observations began before the awakening of the old birds. There were two days when no observations were made. There were 667 visits made to the nest, of which 560 were made by the male and 107 by the female. This great discrepancy is due to the fact that the female did not leave the nest much, but received the food from the male and fed the young herself. The male rarely entirely disappeared within the nest hole. Apparently the female left the nest only to obtain food for herself. No droppings were removed from the nest for the first three days, but must have been eaten by the female, since the nest was left clean.

The average number of visits per hour was a little better than 10. The approach to the nest was usually from the east, the birds alighting on the barbed wire within a few feet of the nest, and then flying out and darting into the nest hole, but many times there was no stop from the time the birds left the place where food was procured until they darted into the nest hole. The male almost invariably sang before and after visiting the nest, unless he flew directly in, and left without first perching on the fence. The food was mostly secured from the oat stubble and the cemetery, but some was found in the corn field, and only a little of it in the orchard.

There were 637 pieces of food brought, of which 161 were Geometrid larvæ, 141 leaf-hoppers, 112 young grasshoppers, 56 bugs, 42 spiders, 29 crickets, 10 moths, 5 ants, 4 scattering, and 29 times nothing was brought. 81 pieces were un-

identifiable. During the first three days the food consisted of Geometrid larvæ and leaf-hoppers, while the grasshoppers, crickets and ants were brought during the last two days.

It will thus be seen that with these three species of birds the preference of food for the young seems to be Geometrid larvæ. This may be partly due to the greater abundance of this food material as well as to the fact that these larvæ are about the right size for feeding birds the size of these, and that they are easily prepared for the young. One would expect the wrens to make use of smaller insects than the sparrows, and the large number of leaf-hoppers fed by them bears this out.

There was no evidence that any of these birds fed by reguritation. In the case of the sparrows this was clearly proved, but what might have happened in the case of the wrens can only be surmised. At any rate, the food was uniformly brought dangling from the bill and was not swallowed before being delivered to the nestlings. This was the case with the very first feedings of both Song Sparrows and House Wrens.

Intensive studies of this sort are needed for all of our birds. It is not an exhausting sort of work, and pays large returns for the effort and time spent. Generalizations are in order only after a considerable number of nests of each species are studied, the nests under as different conditions of environment as possible. As one's experience in this work increases accuracy of observation increases.

PRELIMINARY LIST OF THE BIRDS OF NORTHERN PASSAIC COUNTY, NEW JERSEY.

BY LOUIS S. KOHLER, BLOOMFIELD, N. J.

In preparing the following list of birds, which the author has observed in Upper Passaic County, New Jersey, during the past ten years, all of the species have been included to which may be attached no doubt as to their identification or authenticity of record. The territory covered in these obser-

vations includes the whole of the townships of West Milford and Pompton. The country consists mostly of low rolling hills, heavily wooded, intersected by broad valleys, in whose precincts are located the farming districts of the section. Dotted here and there are many small ponds and lakes, the principal of which are Echo Lake, Mud Pond, Pompton Lake and the lower half of Greenwood Lake. Most of the ponds and lakes are connected by small streams and rivers, forming a network over the whole of the district canvassed. In the western half are located the Bearfort Mountains, the highest in the section. These range from 600 to 1,400 feet in elevation and are heavily wooded with an original growth which covers more than three-quarters of their slopes. At the southern end of this range is located the Kanouse Mountain, another heavily wooded hill, but much lower in elevation. Along the southern border the Pequannock River meanders nearly the whole length of the section and separates these townships from Morris County, their southern neighbor.

But little has ever been written or published regarding the ornithology of this section, and it has been the object of the writer to gather together an authentic as well as a complete record of each and every species present, together with notes on those which breed and rear their progeny with us each year.

(1) *Colymbus auritus*—Horned Grebe. A regular spring and fall migrant. May be resident on the northern lakes during the summer months. Spring dates: April 14, 1906 (Pompton Lake); April 23, 1910 (Echo Lake), and April 14, 1911 (Green wood Lake); April 13, 1912 (Pompton Lake), and April 14, 1913 (Pompton Lake). Fall dates: October 2, 1911 (Echo Lake), and September 29, 1912 (Pompton Lake). Summer date: August 10, 1912 (Greenwood Lake).

(2) *Podilymbus podiceps*—Pied-billed Grebe. A regular spring and autumn migrant. Occasional summer resident. Spring dates: April 10, 1911, and April 18, 1912 (Pompton Lake). Autumnal dates: September 19, 1910 (Pompton Lake); October 8, 1911 (Echo Lake); September 15 and 30, 1912 (Pompton Lake). At Mud Pond on August 17, 1912, thirteen of these birds were observed feeding among the lily pads near the southern shore.

(3) *Gavia immer*—Loon. A rare visitant. A male of this species was observed at Pompton Lake on April 14, 1912, diving and swimming about near the northern end. Only record for the section.

(4) *Larus argentatus*—Herring Gull. A common spring migrant. Rare in autumn and occasional during winter. Numerous spring dates at all of the lakes. Observed but twice during autumn: September 30, 1906, and October 2, 1911. Seen on December 18 and 28, 1912, over Pompton Lake.

(5) *Mergus americanus*—Merganser. Occasional winter and spring visitant. Observed on February 18, 1911 (Wanaque River); March 31, 1912 (Pequannock River), and January 5, 1913 (Echo Lake).

(6) *Anas platyrhynchos*—Mallard. An irregular visitor. Found nesting at Echo Lake and Mud Pond by Cleveland Cook, of Haskell, and C. McKinnon, of Butler, at Rotten Pond. Of these three broods the eggs were measured and averaged 2.24″ by 1.26″, eight, ten and nine, and adult birds observed and positively identified.

(7) *Anas rubripes tristis*—Black Duck. An abundant migrant and occasional winter visitant. A brood of eight with adult female observed at Echo Lake on June 8, 1910. Only record of nesting obtained.

(8) *Nettion carolinensis*—Green-winged Teal. A rather irregular migrant. Individuals observed April 14, 1912, and April 10, 1913, at Pompton Lake.

(9) *Aix sponsa*—Wood Duck. Occasional summer resident. In 1903 ten of this species were observed at Echo Lake, and in 1904 four more were seen at Greenwood Lake. Since that time they have been rather uncommon, only a few individuals appearing each year. One nest with twelve eggs found at Echo Lake on May 28, 1905, and adult female in the close vicinity at finding of this nest.

(10) *Branta canadensis*. A regular spring and autumn migrant. Arrives in spring, April 10 to 25, and departs in fall from October 15 to December 1.

(11) *Ardea herodias*—Great Blue Heron. An occasional visitant, especially during April. Recorded at Pompton Lake April, 21, 1911, and April 14, 1912. Also two were present at Echo Lake on June 20, 1902.

(12) *Butorides virescens*—Green Heron. Abundant summer resident. No nests of this species ever located, but they must certainly breed and nest here, as they are present from April 20 to September 10.

(13) *Philohela minor*—Woodcock. Summer resident; also abundant migrant. Occasional in winter.

(14) *Gallinago delicata*—Wilson Snipe. A regular spring and fall migrant. Arrives about April 1 and returns November 10. Occasionally found during summer months at Greenwood Lake.

(15) *Actitis macularia*—Spotted Sandpiper. Common summer resident. Arrives April 18 to May 10 and departs about September 15. Nests found at Echo Lake in adjacent corn fields and old stubbles on May 28, 1907, and June 2, 1910, and near Pompton Lake on May 16 and 22, 1909. At Sterling Forest, Greenwood Lake, two broods were observed on the 10th and 11th of June, 1907, in company with the adult birds feeding along the lake shore.

(16) *Oxyechus vociferus*—Killdeer. Common migrant and occasional summer resident. Arrives in the spring from March 26 to May 15 and returns in the autumn from September 3 to October 1. Found at Echo Lake on June 20, 1908; Mud Pond on July 4, 1908, and July 16, 1909; Greenwood Lake on August 2, 1910, and along the Pequannock River near Charlottesburg on six different occasions between the 15th and 24th of August, 1911. Nests with eggs found at Echo Lake on May 23 and May 25, 1909, and at Greenwood Lake on May 2, 1912.

(17) *Colinus virginianus—Bob-white*. Permanent resident in the sparsely settled sections. Nests with eggs found at Haskell along a rail fence on May 3 and 5, 1908, and one near Charlottesburg in a similar position on May 1, 1911. These nests in each case contained twelve eggs.

(18) *Bonasa umbellus*—Ruffed Grouse. Permanent resident wherever the preceding species is found. Nests of this species located at Ringwood and Midvale each year since 1909. Prior to this time one with fourteen eggs was found near Echo Lake and one at Upper Macopin on June 7, 1906, the latest date on which the writer has ever located a set of this species on which the female was incubating.

(19) *Zenaidura macroura carolinensis*—Mourning Dove. A common summer resident. Arrives during the latter part of March and early April and remains with us until October. Nests are to be found each year in the sparsely settled districts always in cedar and scrub pines.

(20) *Circus hudsonius*—Marsh Hawk. A common permanent resident. Wherever there is low marshy ground this hawk is sure to be present and their nests are occasionally found in these swamps.

(21) *Accipiter velox*—Sharp-shinned Hawk. A common permanent resident. Found breeding at Echo Lake (April 10, 1907), Sterling Forest, Greenwood Lake (May 3, 1909), Upper Macopin (April 14, 1912), and Pompton Lake (April 28, 1913).

(22) *Accipiter cooperi*—Cooper's Hawk. A common migrant, occasional summer resident and winter visitant. One nest with three eggs found on April 10, 1908, in a beech tree near Echo Lake.

(23) *Buteo borealis*—Red-tailed Hawk. An occasional winter visitor. Individuals observed as early as September 29 and as late as April 30. Never present during summer months.

(24) *Buteo platypterus* — Broad-winged Hawk. A common spring and fall migrant. Occasional during summer and very rare during winter.

(25) *Archibuteo lagopus sanctijohannis*—Rough-legged Hawk. A regular winter visitant. Occasional during spring and fall migrations.

(26) *Haliaetus leucocephalus*—Bald Eagle. Occasional about Greenwood Lake. Observed on June 18, 1906, and October 20, 1910, near Sterling Forest. Also one was seen near Echo Lake on July 15, 1912.

(27) *Falco peregrinus anatum*—Duck Hawk. Occasional transient visitant. Also rare winter resident. Observed on November 3, 1907, and February 6, 1910, at Greenwood Lake, and September 29 and October 18, 1912, at Echo Lake, and one at Midvale, April 14, 1913.

(28) *Falco sparverius*—Sparrow Hawk. A common permanent resident. Nests found each year since 1902 throughout the section, usually in hollow trees or deserted Woodpecker nests.

(29) *Falco columbarius*—Pigeon Hawk. Common transient visitant. Present occasionally during summer months, but no record of their breeding and building homes has been recorded for the section.

(30) *Pandion haliaetus carolinensis*. Abundant migrant. Found breeding at Pompton Lake, on the east shores of Greenwood Lake, and once at Echo Lake. Appears locally about April 15. Individuals observed as late as October 10.

(31) *Strix varia*—Barred Owl. A rather common permanent resident. Nests located at Midvale, Upper Macopin, Ringwood, Sterling Forest and Haskell during the past seven years.

(32) *Otus asio*—Screech Owl. A common permanent resident and breeder throughout the section.

(33) *Coccyzus americanus*—Yellow-billed Cuckoo. Common sum-

mer resident. Arrives May 4 to June 1 and departs October 1 to 10. Breeds and nests commonly in both townships.

(34) *Coccyzus erythrophthalmus*—Black-billed Cuckoo. Common summer resident. Arrives May 16 to June 4, slightly later than the preceding species, and departs usually ten days earlier in the fall. Nests are occasionally found, but not as often as those of the Yellow-billed Cuckoo.

(35) *Ceryle alcyon*—Belted Kingfisher. A common summer resident and breder. Observed at Pompton Lake as late as December 18. Found nesting at Echo Lake and Sager's pond on May 28 and 29, 1908, and at Greenwood Lake on June 2, 1911.

(36) *Dryobates villosus*—Hairy Woodpecker. Permanent resident. To be found in the wooded sections throughout the year. Two nests with eggs found near Ringwood on May 16, 1907. Only records of their breeding here ever obtained.

(37) *Dryobates pubescens medianus*—Downy Woodpecker. A common permanent resident and breeder. More abundant during the winter than at other times during the year.

(38) *Sphyrapicus varius*—Yellow-bellied Sapsucker. A common visitant throughout the year. Never resident.

(39) *Melanerpes erythrocephalus* — Red-headed Woodpecker. Rather common permanent resident. Never abundant, but individuals present on each stroll out in the forested sections. Nests occasionally are found and the adults and young seen more often wherever they are sure of little interference at the hands of mankind.

(40) *Colaptes auratus luteus*—Flicker. A common permanent resident. Some winters these birds are more abundant than others. In 1907 and 1910 they were to be found daily, but in other years from December 1 until March 15 but few are met with. Breeds and nests in every available dead stump and tree throughout the section. This species during the past three years have been the especial enemies of the *Sturnus vulgaris* after their nesting holes have been completed and it is a common sight to see noisy conflicts on each walk between these two species. Usually the Flickers best their combatants, but in a number of cases the *vulgaris* has routed out the owners and taken possession of their homes.

(41) *Anthrostomus vociferus*—Whip-poor-will. Common summer resident. Arrives from May 7 to 26 and departs from September 9 to October 4. Breeds and nests throughout the section in the sparsely settled sections.

(42) *Chordeiles virginianus* — Nighthawk. Common summer

resident. Arrives May 15 to 30 and departs September 9 to October 1. Nests are occasionally found but not as often as the former species. This species is seen in the day more often than the former.

(43) *Chætura pelagica*—Chimney Swift. Common summer resident. Arrives April 26 to May 15 and departs September 15 to October 23. Nests abundantly throughout the section in unused chimneys of the farm houses.

(44) *Archilochus colubris*—Ruby-throated Hummingbird. Common summer resident. Arrives May 7 to 15 and departs September 4 to 15. Nests are occasionally found, but because of their seclusive habits they are widely separated and usually in out of the way places.

(45) *Tyrannus tyrannus*—Kingbird. Common summer resident. Arrives May 6 to 24 and departs September 2 to October 8. Breeds and nests abundantly throughout the section.

(46) *Myiarchus crinitus*—Crested Flycatcher. Common summer resident. Arrives May 6 to 30 and departs August 20 to September 15. Common breeder and home-builder throughout the section.

(47) *Sayornis phœbe*—Phœbe. Common summer resident. Arrives March 16 to 25 and departs September 26 to October 24. Nests under bridges in open sheds throughout the section.

(48) *Myiochanes virens*—Wood Pewee. Common summer resident. Arrives May 6 to 26 and departs September 24 to October 10. Common breeder and home-builder throughout the section.

(49) *Empidonax flaviventris*—Yellow-bellied Flycatcher. Occasional visitant. Observed September 8, 1911, and September 29, 1912, at Haskell.

(50) *Empidonax minimus*—Least Flycatcher. Common summer resident. Arrives April 28 to May 5 and departs September 19 to October 15. Nests throughout the section.

(51) *Otocoris alpestris*—Horned Lark. Occasional autumn and winter visitant. Observed at Echo Lake on September 29, 1908, and October 2, 1910 (Pompton Lake), and December 6, 7 and 8, 1912, at Charlottesburg.

(52) *Cyanocitta cristata*—Blue Jay. Common permanent resident. Breeds and nests throughout the section.

(53) *Corvus brachyrhynchos*—Crow. Common permanent resident. Breeds and nests throughout the section. Of later years these birds have been particularly destructive to young chicks of the barnyards in this section.

(54) *Sturnus vulgaris*—European Starling. Common perma-

nent resident. These birds first appeared in the more populous sections about 1905 and increased yearly, until at the present time their numbers have become so abundant that they have spread out over the whole section and are nesting wherever places are afforded to them. In this section these birds, probably due to their abundance, have become very pugnacious to the resident species and are continually harassing them both while home-building and while in search of food.

(55) *Dolichonyx oryzivorus*—Bobolink. Common summer resident. Arrives in early May and departs from September 15 to 29. Numerous nests are located each year throughout this section.

(56) *Molothrus ater*—Cowbird. Common summer resident. Arrives March 15 to April 15 and departs October 1 to November 11. Their eggs have been located in the nests of the *Vireosylva gilva*, *Lanivireo flavifrons*, *Dendroica æstiva*, and *Setophaga ruticilla*.

(57) *Agelaius phœniceus* — Red-winged Blackbird. Common summer resident. Arrives March 12 to 30 and departs October 7 to November 29. Nests wherever available grounds are located.

(58) *Sturnella magna*—Meadowlark. Common permanent resident. Breeds and nests throughout the section in old fields and wherever they are afforded sufficient protection from the invasion of mankind.

(59) *Icterus spurius*—Orchard Oriole. Common summer resident. Arrives about May 15 and departs between September 10 and 15. A male was observed at Echo Lake on October 3, which is the latest date on record for this species in this vicinity. Their nests may be found in most every orchard well away from the habitations of man.

(60) *Icterus galbula*—Baltimore Oriole. Common summer resident. Much more abundant than the former species. Arrives from May 4 to May 10 and departs September 15 to October 1. An abundant breeder and home-builder.

(61) *Euphagus carolinus*—Rusty Blackbird. Common migrant. appears locally from March 20 to April 14 and departs September 19 to October 2.

(62) *Quiscalus quiscula*—Purple Grackle. Common summer resident. Individuals present in sheltered swamps throughout the winter. Abundant breeder and nest-builder wherever the conifers abound.

(63) *Quiscalus quiscula æneus*—Bronzed Grackle. Individuals of this species appear during the migrations each year.

(64) *Passer domesticus*—English Sparrow. This exotic is about the same here as it is in all rural sections.

(65) *Carpodacus purpureus*—Purple Finch. An abundant migrant and winter resident. Arrives from the south in the spring from April 10 to May 25, and returns in the fall about September 15.

(66) *Loxia curvirostra minor.*—Red Crossbill. Individuals of this species have been observed on three occasions: October 29, 1908 (Echo Lake); December 2 (Midvale), and April 17, 1910 (Upper Macopin).

(67) *Astragalinus tristis*—Goldfinch. Common permanent resident. Abundant breeder and nest-builder throughout the section.

(68) *Plectophenax nivalis*—Snowflake. Irregular winter visitant. Located on January 4, 1906, February 8, 1909, and January 14, 1910, on the eastern slopes of the Bearfort Mountains in West Milford Township.

(69) *Pooecetes gramineus*—Vesper Sparrow. Common summer resident. Arrives March 16 to April 10 and departs November 1 to December 2. Nests located in open fields always adjacent to a ready supply of water.

(70) *Passerculus sandwichensis savanna*—Savanna Sparrow. Regular but not common migrant. Arrives April 1 to May 10 and departs from September 15 to October 1.

(71) *Ammodramus savannarum australis*—Grasshopper Sparrow. Common summer resident. Arrives about April 30 and remains until October 10. Nests abundantly throughout the section.

(72) *Zonotrichia albicollis*—White-throated Sparrow. Common migrant and winter resident. Arrives in the fall, October 1 to 15, and departs in the spring from April 30 to May 20.

(73) *Spizella monticola*—Tree Sparrow. Common winter resident. Arrives about October 10 and departs about April 1.

(74) *Spizella passerina*—Chipping Sparrow. Common summer resident. Arrives March 15 to April 8 and departs October 20 to November 1. Observed as late as November 29. Nests abundantly throughout the section.

(75) *Spizella pusilla*—Field Sparrow. Common summer resident. Arrives about March 25 to April 9 and departs October 15 to November 10. Common breeder throughout the section in the open dry fields.

(76) *Junco hyemalis*—Slate-colored Junco. Abundant winter resident. Arrives about November 1 to 15 and departs April 15 to May 1.

(77) *Melospiza melodia*—Song Sparrow. Common permanent resident. Most abundant during migrations when their songs are

particularly beautiful. Abundant breeder throughout the section.

(78) *Melospiza georgiana*—Swamp Sparrow. Common summer resident wherever water and low marshy tracts prevail. Arrives March 10 to April 15 and departs October 20 to December 1. Nests occasionally found.

(79) *Passerella iliaca*—Fox Sparrow. Common migrant. Occasional winter resident, especially when the berries of the low bushes have not been destroyed by fires. Arrive in the spring, March 10 to 20, and depart in the fall, November 1 to 15.

(80) *Pipilo erythrophthalmus*—Towhee. Common summer resident. Arrives April 20 to May 1 and departs October 15 to November 10. Abundant breeder.

(81) *Cardinalis cardinalis*—Cardinal. Transient visitant, occurring at all times of the year. Observed at Echo Lake, Midvale, Greenwood Lake, and many places in the Bearfort and Kanouse Mountains.

(82) *Zamelodai ludoviciana*—Rose-breasted Grosbeak. Common summer resident. Arrives May 1 to 15 and departs September 15 to October 1. Nests occasionally found in the more restricted localities.

(83) *Passerina cyanea*—Indigo Bunting. Common summer resident. Arrives May 1 to 10 and departs September 15 to 25. Abundant breeder and home-builder.

(84) *Piranga erythromeles*—Scarlet Tanager. Common summer resident. Arrives about May 7 and remains until September 15. Nests wherever the oaks abound in the heavily wooded sections.

(85) *Progne subis*—Purple Martin. Occasional visitant during the summer months. Observed at Greenwood Lake June 20, 1908; July 15 and 16, 1910, and August 27, 1911. At Echo Lake two were seen on July 30, 1909.

(86) *Petrochelidon lunifrons*—Cliff Swallow. Common migrant and occasional summer visitant.

(87) *Hirundo erythrogastra*—Barn Swallow. Common summer resident. Arrives April 1 to 15 and departs September 5 to 15. Nests throughout the section in open barns and granaries.

(88) *Iridoprocne bicolor*—Tree Swallow. Common summer resident. Arrives about April 10 and departs about October 20. Nests are found occasionally in hollow trees near Greenwood and Echo Lakes.

(89) *Riparia riparia*—Bank Swallow. Common summer resident. Arrives about April 25 and returns about September 15. Nests in sand-banks and occasionally under bridges.

(90) *Stelgidopteryx serripenis*—Rough-winged Swallow. Rather common summer resident. Arrive April 15 to 20 and depart September 1 to 10. Nests wholly under bridges in this section.

(91) *Bonbycilla cedrorum*—Cedar Waxwing. Common summer resident; also irregular winter visitant. Nest in orchard throughout the section. Always very gregarious except during the breeding and nesting period.

(92) *Lanius borealis*—Northern Shrike. One male of this species observed near Midvale on February 22, 1909. Only record for the section.

(93) *Lanius ludovicianus migrans* — Migrant Shrike. A few of these have been observed from time to time near Haskell during the fall migrations of 1908 and 1909.

(94) *Vireosylva olivacea*—Red-eyed Vireo. A common summer resident. Arrive about May 8 and depart September 15 to 20. Abundant breeders and nest throughout the section.

(95) *Vireosylva gilva*—Warbling Vireo. Common summer resident. Arrive May 5 to 10 and depart about September 20. Nest throughout the section. This species is greatly imposed upon by the *Molothrus ater*, and out of seventy-five nests examined during the past decade, sixty-one contained eggs of this parasite.

(96) *Lanivireo flavifrons* — Yellow-throated Vireo. Common summer resident. Arrive May 1 to 10 and depart May 25 to October 2. Nest abundantly throughout section. Occasional eggs of the *Molothrus ater* are found in these nests, but the percentage is very small, probably not over five per cent.

(97) *Vireo griseus*—White-eyed Vireo. Occasional summer visitant. Never resident.

(98) *Mniotilta varia*—Black and White Warbler. Common summer resident. Arrive April 25 to May 4 and depart October 1 to 10. No nest of this species has ever been located, but they must certainly nest here, as they are present from the time that they arrive until they depart in the fall.

(99) *Helmitheros vermivorus* — Worm-eating Warbler. Occasional spring migrant and summer visitant. Rare in the fall. Arrive about May 5. Individuals have been observed at Greenwood Lake and on the western slope of the Bearforts during July and early August.

(100) *Vermivora pinus*—Blue-winged Warbler. Rather common migrant and summer visitant. Observed as late as October 3 near the southern edge of the section.

(101) *Vermivora chrysoptera*—Golden-winged Warbler. Rather

rare migrant. Passes north May 7 to 16 and returns about September 1. Observed as early as April 29 at Pompton Lake.

(102) *Compsothlypis americana usneae*—Northern Parula Warbler. Common spring and fall migrant. Arrives May 5 to 15 and departs October 1 to 10.

(103) *Dendroica æstiva*—Yellow Warbler. Common summer resident. Arrives April 26 to May 5 and departs September 20 to October 1. Abundant breeder and home-builder in this section. Imposed upon occasionally by the *Molothrus ater*.

(104) *Dendroica cærulescens*—Black-throated Blue Warbler. A common migrant and occasional summer resident at the northern limits of the section. Arrive May 7 to 15 and depart September 15 to October 3.

(105) *Dendroica coronata*—Myrtle Warbler. Common migrant and occasional winter visitant. Arrives April 9 to 20 and departs October 10 to November 5.

(106) *Dendroica magnolia*—Magnolia Warbler. Common migrant. Arrives May 7 to 15 and departs September 1 to 15.

(107) *Dendroica pensylvanica*—Chestnut-sided Warbler. Common summer resident. Very abundant during the spring migration. Rare during autumnal flight. Nests in many places in the sparsely settled sections.

(108) *Dendroica castanea*—Bay-breasted Warbler. Rare migrant. Located on May 5, 1909, May 14, 1911, and May 12, 1912, at Echo Lake. Only records for section.

(109) *Dendroica striata*—Blackpoll Warbler. Common spring and fall migrant. Arrives May 10 to 24 and returns September 15 to October 1.

(110) *Dendroica fusca*—Blackburnian Warbler. Tolerably common migrant. Most abundant during the southern migration. Arrives May 10 to 15 and departs September 1 to 15.

(111) *Dendroica virens*—Black-throated Green Warbler. Common migrant. Arrives May 4 to 8 and returns September 10 to 20.

(112) *Dendroica vigorsi*—Pine Warbler. Common migrant. Appears locally April 10 to May 5 and returns October 1 to 5.

(113) *Dendroica palmarum hypochrysea*—Yellow Palm Warbler. Common migrant. Arrives April 10 to 22. Returns October 1 to 15.

(114) *Seiurus aurocapillus*—Oven-bird. Common summer resident. Arrives about May 5 and remains until October 10. Nests abundantly throughout the section.

(115) *Seiurus noveboracensis* — Water-Thrush. Common trans-

lent visitant. Numerous birds are seen each year at Pompton and Echo Lakes, especially during the latter part of August. Have been met with at Greenwood Lake on two occasions during the early part of September.

(116) *Geothlypis trichas*—Maryland Yellowthroat. Common summer resident. Arrives about May 5 and remains until October 10. Nests abundantly throughout the section.

(117) *Icteria Virens*—Yellow-breasted Chat. Common summer resident. Arrives May 10 to 15 and departs September 15 to 20. Common breeder throughout the section.

(118) *Wilsonia citrina*—Hooded Warbler. Common summer resident. Usually found in the more sparsely settled sections, where their nests are occasionally located. Arrive about May 7 to 10 and depart September 10 to 15.

(119) *Wilsonia pusilla*—Wilson Warbler. Common migrant. Arrives May 10 to 19 and returns September 1 to 5.

(120) *Wilsonia canadensis*—Canadian Warbler. Common migrant. Arrives May 10 to 16 and departs September 5 to 20.

(121) *Setophaga ruticilla*—Redstart. Common summer resident. Arrives April 28 to May 5 and remains until October 1 to 10. Nests abundantly throughout the section.

(122) *Anthus rubescens*—Pipit. Common spring and fall migrant. Arrive March 28 to April 1. Return October 15 to December 1.

(123) *Mimus polyglottos* — Mockingbird. One male observed near Upper Macopin, just above Echo Lake on July 28, 1909. This is the only bird of this species which has ever come to the writer's attention alive. Two other males are in the possession of Mrs. George Brown, Midvale, which she claims her husband shot some twenty years ago near Ringwood, and were preserved by him.

(124) *Dumetella carolinensis*—Catbird. Common summer resident. Arrive April 28 to May 5 and return October 1 to 20. Nest and breed throughout the section.

(125) *Toxostoma rufum*—Brown Thrasher. Common summer resident. Arrives April 10 to 25 and depart October 10 to 15. Nest abundantly throughout the section.

(126) *Thryothorus ludovicianus* — Carolina Wren. Occasional summer resident, but more often visitant. One family of adults and four young observed at Pompton Lake, July 18, 1907.

(127) *Troglodytes aëdon*—House Wren. Common summer resi-

dent. Arrive April 25 to May 10. Depart September 25 to October 10. Nest commonly throughout section.

(128) *Cistothorus stellaris*—Short-billed Marsh Wren. Common summer resident, but not nearly as abundant as the following species. Nests found each year since the late nineties at Echo Lake and Mud Pond.

(129) *Telamatodytes palustris*—Long-billed Marsh Wren. Common summer resident wherever suitable grounds are located. This is by far the most common of the *Troglodytæ* of this section. Nest abundantly wherever they are found. Arrive about May 15 and depart about October 1.

(130) *Certhia familiaris americana*—Brown Creeper. Common winter resident.

(131) *Sitta carolinensis*—White-breasted Nuthatch. Common permanent resident. Present in greater numbers during the winter than at other times of the year. Three nests have been located in this section since 1903 in the Bearforts.

(132) *Sitta canadensis*—Red-breasted Nuthatch. Occasional winter visitant. Observed December 5, 1908 (Upper Macopin); January 17, 1910 (Pompton Lake); February 2, 1911 (Echo Lake), and December 17 and 22, 1912, at Ringwood.

(133) *Bæolophus bicolor*—Tufted Titmouse. Irregular winter visitant throughout the section. On rare occasions they are observed during June and September in the heavily wooded sections.

(134) *Penthestes atricapillus*—Black-capped Chickadee. Common permanent resident. Nests are occasionally located in the heavily forested sections well away from the habitations of man and where a ready supply of water and food are present.

(135) *Regulus satrapa*—Golden-crowned Kinglet. A common winter resident. Arrive about September 15 and remain until April 1.

(136) *Regulus calendula*—Ruby-crowned Kinglet. Common migrant. Arrive April 10 to 25 and return September 20 to October 15.

(137) *Hylocichla mustelina*—Wood Thrush. Common summer resident. Arrive about May 1 and remain until September 25. Nest commonly throughout the section.

(138) *Hylocichla fuscescens*—Wilson Thrush. Common summer resident. Arrive April 15 to 25 and depart September 15 to 20. Never during the past decade has a nest of this species been located in this section. But there is no doubt in the mind of the

writer but that they breed and nest here, as they are present from the time they arrive until they depart in the fall.

(139) *Hylocichla aliciæ*—Grey-cheeked Thrush. Common Migrant. Arrive May 1 to 20 and depart October 1 to 10.

(140) *Hylocichla ustulata swainsoni* — Olive-backed Thrush. Common migrant. Arrive May 5 to 15 and return September 20 to 25.

(141) *Hylocichla guttata pallasi*—Hermit Thrush. Common migrant. Occasional winter visitant, and during the years 1907-1912 they have been met occasionally during the summer months in the heavily forested sections of Bearforts west of Greenwood Lake. On May 27, 1910, a completed nest was located, and on June 10 contained four young birds about five days old. This is the only record I can find for this species nesting in New Jersey.

(142) *Planesticus migratorius*—Robin. Common summer resident. Also abundant during entire year in a few sheltered swamps. Nest abundantly throughout the section.

(143) *Sialia sialis*—Bluebird. Common permanent resident. Nest abuntantly throughout the section.

(144) *Phasianus colchicus*—English Pheasant. Common permanent resident. Breeds and nests in the more rural sections of the two townships.

THE CARDINAL AND THE BROWN THRASHER.

BY MARION E. SPARKS.

Miss Sherman's notes on the Brown Thrasher explain in part why books and birds do not always agree. In central Illinois the Thrasher, like the Rose-breasted Grosbeak, sings in town, from the tallest twig that will bear his weight, is cheerful and alive to the tip of each feather. In the country osage orange hedges or orchard trees provide the Thrasher with both singing and nesting places, the latter usually five to six feet from the ground, though one was found near the ground by means of the fuss the birds were making because a small child was looking into the nest. I have never found another lower than five feet from the ground.

The Catbirds of my acquaintance have been impudent, not shy, for while they can move more quietly than mice, they seem to fear nothing; however, they refuse to remain when

the Cardinal comes. The Thrasher and Rusty Blackbird, too, all three tenants of our yard for nearly twenty years, moved out or were driven away by this gay and noisy bird.

A pair of Cardinals made a nest in 1911 in a trellis against the house, about ten feet from the kitchen door, using chiefly bark from the grape arbor across the driveway. They had one young one, that left the nest while it could barely fly six feet, a tailless brownish, homely bird, in late June. It followed and teased the old birds for its food, till they left in the fall.

In 1912 a pair built in the same spot and raised, to nest-leaving size, one young one.

Soon the male was whistling and calling as in early spring, and in a few weeks a new nest was found, in a pear tree about two rods distant. It was like the others, made of bark stripped from grapevines, but seemed more flimsy and less well built than the other two. This nest was nearly eight feet from the ground; the others only five, but "protected" by a rose bush growing against the vine trellis. Again there was one young bird, and the amusing spectacle was presented of the two young birds of different sizes tagging after their parents and clamoring to be fed, and the bigger one tried to get the larger share.

This continued till the birds left in October. One male, however, remained late, calling and whistling till November.

On March 4, 1913, a pair came back, and it remains to be seen if they will continue the proceedings. They are certainly quarrelsome; even the Blue Jays give up the bathing pan to them in haste.

The musical whistle, repeated at short intervals nearly all day for several months, is monotonous and less pleasing than the variety provided by the Thrasher, the Catbird or the Rose-breasted Grosbeak. There was a little while in late September and early October when they did not whistle and call, but before leaving the whistling was begun again by the one male, who stayed late.

May 12, 1913. The Cardinal is whistling and calling yet.

The nest, if made, has not been found. There are two pairs here this year in the haunts where for the two years before only one pair had been.

May 31, 1913. No nest; no Cardinals.

THE EXTERMINATION OF THE WILD TURKEY IN CLAYTON COUNTY, IOWA.

BY ALTHEA R. SHERMAN.

Some brief reference to the history of Iowa may afford a better understanding of the early status, and speedy extinction of the Wild Turkey in Clayton County, following the occupancy of its land by the white race. After the treaty of 1804, made by the United States Government with the Sacs and Fox Indians, the whole of Iowa (excepting a few square miles in the northeast corner, which were claimed by the Sioux) was set apart as the tribal property of the Sacs and Foxes. It was held by them as their private hunting grounds and was jealously guarded by these warlike Indians from encroachment by other tribes. At the same time it was one of the duties of United States soldiers stationed in the frontier forts to protect these Indians in their rights by expelling any of the whites who ventured across the Mississippi River. Among the participants in this work of expulsion were two soldiers, who afterward became prominent characters in United States history, Colonel Zachary Taylor and one of his lieutenants, Jefferson Davis. There can be no doubt that their task of keeping white men out of this territory was well done; also that the Indians acting upon the principles of true conservation, maintained a great abundance of game.

In 1832, after their defeat in the Blackhawk War, the Sac and Fox Indians were forced to relinquish the eastern portion of their hunting grounds, which was thrown open for white occupancy the following year. The stream of immigration that slowly trickled into Clayton County was a feeble one, very unlike the tidal wave that swept over Oklahoma fifty-five years later. The early settlers in this part of Iowa

had no lack of domestic animals for food, hence the destruction of the Wild Turkey did not have its origin in the needs of mankind. The great abundance of this species in its neighborhood gave the name Turkey River to a stream that takes a southeasterly course almost diagonally across the county. This refers to its present boundaries, not to its early ones in the days of magnificent distances, when Clayton County stretched for unnumbered miles to the westward, and was bounded on the north by the Dominion of Canada—then called British America. In pioneer days all the land in the southeastern part of the county, upward of two hundred square miles, was covered with a heavy forest of hardwood trees, except the bottom lands at the mouth of the Turkey River, where it is said "horse-weed" grew in rank profusion, yielding a black, oily seed that was a favorite food of the Wild Turkeys.

Very few of the people are now living who came to this region in the late thirties; but ten years ago there were others, some of whom were contributors to "The Old Settlers Edition" of the North Iowa Times, published February 19, 1903. From its columns are taken the following excerpts from the story told by Mrs. Ann Dickens, who moved to Clayton County in April, 1836: "A view of Turkey River and its surrounding bluff at this time would hardly bring to mind what it was in the days of 1836. When I arrived there, the hills were covered with immense timber and no undergrowth, owing to the Indians' custom of burning the ground every fall to help the growth of feed for deer. The woods were full of panthers, bears, wild cats, wolves, foxes, deer and wild turkey; and I have often wondered how those wild turkeys lived and multiplied to such a great extent, where the woods were full of wild animals, for whom the eggs and the turkey's young would be such a toothsome meal.

"The Indians' name for the Turkey River was Sesick, Anashungara.

"At stated times during the year a regular trail was formed by the wild turkeys crossing the river, which, from this fact,

took its name. I have seen a train of them, two to four abreast, extending from the river's bank to the forest a quarter of a mile away.

"A great many of these turkeys were trapped, the trap a crude affair, but effective, to the extent that one night my husband secured twenty-four of them. The trap was simply an area about ten feet square, enclosed and covered. A trench extended from the outside, and gradually descending, ran under the wall, opening on the inside. Through this trench the turkeys walked, led on by the corn that had been generously sprinkled there."

Levy Springer, also a pioneer of 1836, contributed the following: "Deer and wild turkey were plenty, and I have seen as many as ten or a dozen of the latter at one time playing on a high point not over 150 yards from our house. They used to frequent that point in the spring of the year, but they were generally poor and we did not bother them."

Hon. Robert Quigley, at present senator from this district to the Iowa legislature, relates, that when a small boy he was present at the killing of the last Wild Turkeys on Buck Creek. They were two gobblers, weighing twenty and twenty-two pounds respectively, and were shot by his uncle, David Griffith, about the year 1853 or 1854; also that after that date a few other birds of this species were taken at different points near the Turkey River. From this it appears that a game bird, preserved in great numbers by the conservation of the Indians, did not survive the coming of the white man longer than twenty years. It is noteworthy that this is exactly half the period it took to bring the species to the verge of extinction in New England, according to the writings of John Joselyn, as recently quoted by Mr. E. H. Forbush in his "Game Birds, Wild Fowl and Shore Birds."

Concerning the species Dr. P. R. Hoy is quoted in "The Birds of Wisconsin" as saying that the winter of 1842 was practically fatal to them, "snow was yet two feet deep in March, with a stout crust, so that the turkeys could not get to the ground. They became so poor and weak that they

could not fly, and thus became an easy prey to the wolves, foxes, wild cats, minks, etc., which exterminated almost the entire race." Like weather conditions may have prevailed in Iowa, and a similar disaster may have overtaken the Wild Turkey; if so, its story has not survived their disappearance.

NOTES ON THE SAGE HEN.

BY S. S. VISHER.

[State Geological and Biological Survey, University of South Dakota, Vermilion, S. D.]

The Sage Grouse (*Centrocercus urophasianus*) is in many respects one of the most interesting of the birds of many portions of the west. The cock is almost as large as a hen turkey, so he is big enough to attract anyone's attention. All grouse are wonderfully effectively colored from the standpoint of protection. Some, of which the sage hen is one, have so much confidence in their invisibility that they have been dubbed "Fool Hens," because they allow such close approach. It is astonishing how completely hidden a sage chick can be, even on bare ground. Many a time I have come upon a mother walking conspicuously along with her brood. When she flew they would squat low on the short grass and disappear from sight. It is a mighty good test of acuteness of observation to then try to find all the young. Perhaps some may be located quite easily, but others, "in plain sight," will not be seen until they fly almost from under one's feet.

As the name implies, sage hens are found in areas where the sage brush (chiefly *Artemesia tridentata*) is abundant. Formerly they were found in many sections of western South Dakota and westward. The last ones recorded from this state, except in the northwestern corner, were found in Sage Creek in the Badlands in 1907. By 1910 all were gone except those in Harding and Butte Counties. Now (1913), after three more years of homesteading, Sage Grouse are restricted in this state to the Little Missouri Valley in Harding County and to the headwaters of Indian Creek in Butte.

In a very few years they will occur in South Dakota only as a rare winter straggler from Montana.

This widespread extermination of the Sage Grouse is in spite of the fact that the flesh of all but the youngest sage hens tastes so strongly of sage that they are not usually considered edible. Sage hens are somewhat destructive to gardens and are sometimes killed as pests. The young, which are easily shot with a 22 rifle, are used extensively as food.

Polygamy among wild birds is very rare and the Sage Grouse is one of our few examples. The mating dance takes place in April and May and lasts from dawn till well along in the forenoon. Upon an open grassy slope as many as fifty of these stately birds will gather. The cocks walk about with tail widespread and the neck much distended by the inflation of the air sacs. Upon approaching a female the male drags one wing on the ground. From time to time the cock utters a dull ringing note, which can be heard but a very few rods. The females seem to pay little attention to the dance, nor do they select mates in any obvious manner, since several are looked upon with favor during a single morning.

The nest is made in a slight depression and contains from seven to nine spotted eggs. The young remain with the mother until winter. They spend the night, not on the lower flats along streams, where most of the day is spent, but on the edge of upland, frequently near the border of a patch of sand grass. The flock sleep within a few feet of each other. The mother clucks to her very young chicks after the same manner as does the domestic hen.

During the summer the cocks congregate together, while unfortunate females are solitary. Sage hens require drinking water and are hence found near waterholes. Since a few small trees are usually found near our permanent pools the most frequent place to find sage hens in the heat of the day is sprawled out in the shade of the single tree, or under a nearby "cut bank."

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Editorial

It has not been possible to arrange for a meeting until after the close of the summer. Arrangements will be made and announced either in the September number or by letter. Keep it in mind.

The absence of the Editor for the summer will probably necessitate some delay in the appearance of the September Bulletin. You can lessen the delay by sending in something for publication at an early date.

The editor leaves on June 26. He will have for his postoffice until August 1, Kelleys Island, Ohio, to which address letters should be directed. The occasion of the change of address is a class of 18 students, who go for an intimate study of the breeding habits and summer distribution of birds, and for the study of breeding environment of the species. This work will occupy the first six weeks, and will be followed by a six weeks' study of the southward migration movement over the same region, until near the close of September, with a company of ten men. Please note the change of address.

The editor spent four days—May 9 to 12—in company with Mr. George L. Fordyce, of Youngstown, Ohio, studying the birds. The first two days were spent at Youngstown, where 116 species were recorded on the 9th, and 113 on the 10th. An overland automobile ride to Vermilion on the 11th and a study of the birds along the shore of Lake Erie on the 12th, completed the pleasant studies. The warbler migrations were at their height at Youngstown on the two days spent there, but did not reach the lake shore until more than a week later.

It has been suggested that the publication of May Day horizons would be valuable as showing the progress of the migrations the country over, as well as indicating the distribution of the birds. The editor would be pleased to receive expressions of opinion upon this point. He is entirely ready to give space in the Bulletin to such lists which give evidence of careful work, and believes that such a movement is worth while.

This is the time of year when breeding habit studies ought to be undertaken more generally. It is not difficult to find a nest, and it is not a serious task to give the whole of several days in the study of the feeding habits of many species of birds. Most of the sparrows, the wrens, and many others, permit so close an approach that even a blind is not necessary for close observation. One may sit in comfort while observing the feeding habits of the Field or Song Sparrow, for instance. Try it and prove or disprove this assertion.

General Notes

WINTER BIRDS OF NORTHERN McKENZIE COUNTY, NORTH DAKOTA.

These notes are from November, 1912, to March, 1913. The north line of McKenzie county is the Missouri River and south from the river is a collection of breaks, hills, cut-banks, gulches, ravines, creeks and coulees, which extend for about six miles, except along the larger creeks, where the adjacent land is more or less undulating. Between the creeks are broad stretches of level farming land. On the prairies there are no trees except what has been planted by the settler from about eight years ago.

On the Missouri River bottom are to be found groves of Cottonwood, Elm, Ash, Box-alder and Willow, with a mixture of Buffaloberry, Plum and Choke-cherry trees. In the breaks and gulches

are to be found Red Cedars and various other Junipers, and on the creek bottoms and side hills are to be found, besides the deciduous trees mentioned, Poplar, Diamond Willow, June-berry, Hawthorn, Birch-bush, Wild Rose-bush and occasionally Sage-bush. Wild Hops and Climbing Fake Butternut Vines abound.

Of the mammals, three or four species of field mice are altogether too numerous. Jack-rabbits are common on the prairies, and in the bush Snow-shoe rabbits and occasionally a Cotton-tail are found; Chip-munks are common in the timber; Coyotes and Weasels are to be found everywhere, judging from the tracks; Porcupines are also occasionally seen.

The temperature in winter is somewhat cool, occasionally going down to 50° below zero; generally always an abundance of snow, and winds that blow steady from one direction for a week at a time. There is a notable absence of birds of prey. Perhaps this accounts for the abundance of the smaller mammals mentioned.

1. Prairie Sharp-tailed Grouse—The commonest winter bird in the coulees, gathering in immense flocks and becoming rather *tame*, even alighting on barns and sheds. In what stomachs I have examined I have found the following seeds: Wheat, oats, flax, wild oats and rose-buds.

2. Short-eared Owl—Occasionally seen. Can be found almost anywhere.

3. Snowy Owl—Only one seen.

4. Desert Horned Lark—Becomes common in February after the first few warm days.

5. Hoyt's Horned Lark—Occasionally seen during the winter.

6. Magpie—Another common resident. The Magpie will eat any kind of flesh. They like to investigate refuse piles.

7. Redpoll—Rare. Two seen February 8.

8. Lapland Longspur—Occasionally seen during the winter, but becomes more common in February.

9. Snow Bunting—Common in winter on the prairies, gathering in immense flocks.

10. Bohemian Waxwing—Shot a solitary male on November 12. Stomach contained a few Buffalo-berries.

11. Northern Shrike—Seen only a few times; rather shy.

12. Long-tailed Chickadee—Common on the river bottom in the timber; not often found any other place.

13. Robin—Two seen January 26; certainly must have been stragglers.

14. English Sparrow—He is here well enough, and thirty miles from a railroad.

ADRIAN LARSON.

Keene, N. Dak.

BIRDS NOTED NEAR DELAWARE, OHIO, FROM DECEMBER 1 TO FEBRUARY 18.

1. Song Sparrow.
2. Tree Sparrow.
3. Junco.
4. Goldfinch.
5. Bluebird. One pair in January.
6. Robin. Small company in January.
7. Cedar Waxwing.
8. Mourning Dove. Not common.
9. Bob-white. Rare.
10. Meadowlark. Common.
11. Prairie Horned Lark. One company of 30 to 40.
12. Bronzed Grackle. A small company has lived in the suburbs of city all winter.
13. Downy Woodpecker. Plentiful.
14. Hairy Woodpecker.
15. Red-bellied Woodpecker. Rare.
16. Northern Flicker. Common.
17. White-breasted Nuthatch. Common.
18. Red-breasted Nuthatch. Plentiful for casual residents.
19. Brown Creeper.
20. Cardinal. Plentiful.
21. Crow. Common.
22. Red-tailed Hawk. Common.
23. Sparrow Hawk. Common.
24. Sharp-shinned Hawk. Rare.
25. Marsh Hawk. One record.
26. Barred Owl. Two records.
27. Screech Owl. Common.
28. Blue Jay. Common.
29. Purple Finch. Three records. Found them feeding on the seeds of the hornbeam.
30. Tufted Titmouse. Common.
31. Chickadee. Rare.
32. Belted Kingfisher. Three records. One in January and two in February. River has been open here all winter.
33. Golden-crowned Kinglets. Two records. Both in January.

The migrant Doves, Meadowlarks, Grackle, Red-wings (males) have come in considerable numbers.

C. R. WALLACE.

Delaware, Ohio, March 14, 1913.

THE FOOD OF NESTLING GOLDFINCHES.

On page 21 of the Wilson Bulletin for March, 1913, there appears the following reference to the food of nestling Goldfinches:

"Then comes a busy time, for the parents must hurry around and catch enough insects, mainly plant-lice and flies, for their insatiable little charges."

In the year 1897 we had occasion to ascertain the food of nestling Goldfinches. We had become interested in moult and feather development and desired to rear a few young from the nest by hand. We easily located two nests in a piece of bushy pasture land within sight of a considerable area covered with American thistles and each contained five newly hatched young on August 25. We waited one week and then conducted an investigation of three hours' duration. In brief, we many times saw the parents gather thistle seed and fly directly to the nest, and after regurgitation the seeds could be felt in the crops of the young. We killed one while in this condition and its crop contained nothing but thistle seed, in a softened state, caused by a fluid that may have come from the parent. We took two of the young and succeeded in rearing one on a diet of boiled thistle seed, to which bread was added in a week and gradually replaced by crushed hemp seed soaked in water, and at the age of four weeks the bird was on a diet of the ordinary mixed seed for canaries and did not receive any food of an animal nature from the time it was taken from the nest until the first moult. In conclusion, the Goldfinches we observed did not look for insects, nor were there any in the crops examined, while the rearing of the nestling without insect food indicates that such food is not essential if used at all.

J. CLAIRE WOOD.

HAROLD BAILEY WILL PUBLISH BOOK ON BIRDS.

James E. Abbe, formerly of this city, but now representing the publishing firm of J. P. Bell Company of Lynchburg, arrived here Friday and yesterday closed a deal with Harold Bailey, the well known ornithologist of this city, for the publication of Mr. Bailey's new work on "Virginia Breeding Birds."

This book, with its many beautiful color plates and half-tone cuts, Mr. Abbe says, when published, will be equal to anything ever gotten out in the nature book line.

Virginia has up to now been without a publication of this nature, such as has been published in many other states, and the reputation for high-class publishing that Mr. Abbe's company enjoys, is an assurance that the book is to be a finished product.

Harold H. Bailey announces that the J. P. Bell Publishing Co. of Lynchburg, Va., have started work on the publication of this book, "Breeding Birds of Virginia," which they expect to have before the public on or about June 1, 1913. There will be fourteen full page color plates of birds, heretofore unfigured, which, with the one hundred and eight half-tones taken from nature, represents the greater part of the species figured in the text of over three hundred pages. Virginia being the overlapping boundary of many of the northern and southern forms, the field covered should be of special interest to the ornithologists. As this will be a limited edition, those desiring to secure a copy should notify the author at Newport News, Va., as early as possible. The publishers are noted for their high-class work, and both they and Mr. Bailey guarantee the whole work to be above the ordinary. The price will be $3.00 (three dollars).

EARLY ROOSTING FLIGHTS OF THE TREE SWALLOW AT BLOOMFIELD, N. J.

During the latter part of May and the first ten days of June, 1912, there occurred at this place daily flights of the Tree Swallow. These flights commenced on the 25th of May and lasted until the 10th of June. The birds would appear from the west at about five-thirty each evening in immense numbers and the flight would continue until seven p. m. As the birds flew low, they could be readily observed, and each flock, so far as could be seen, were composed only of the adult birds of both sexes. Prior to this time these flights have never been observed before July 25, at which time they become a regular happening in the course of the day's events.

After the 10th of June, however, these flights discontinued and only a few stragglers were observed wending their way towards the meadows until the usual time for them to begin flying again in late July.

LOUIS S. KOHLER.

A RUNT CROW (*Corvus brachyrhynchos*) AT POMPTON LAKES, N. J.

While making investigations as to the summer food of the *Corvus brachyrhynchos* at this place during the summer of 1912, among a lot of twenty birds shot, was one which was very abnormal in many ways. This bird measured in length 13.75"; wing (right) 9.90, (left) 9.95; tail, 5.85; exposed culmen, 1.60; depth of bill, .70; tarsus (right) 2.00, (left) 2.15. The plumage was a dead black totally devoid of gloss or sheen and the tarsi were deep

brown, tinged with bluish, especially on the upper parts. The other birds in this lot averaged as the normal bird would do.

Of the twenty stomachs examined the food consisted as follows: Corn, fruit and other grains, 40 per cent; beetles, 10 per cent; vertebrates, 23 per cent; lepidoptera, 15 per cent; spiders, 2 per cent, and miscellaneus invertebrates, 10 per cent.

Of the first division, corn (yellow) made up 75 per cent and the remainder consisted of oats and rye. In the second division ground beetles composed wholly the food of this class; of the vertebrates, were remains of several species of batrachians and field mice; of the lepidoptera were numerous caterpillars and moths; of the arachnida were numerous Geometrical spiders and an occasional crayfish, and the miscellaneous invertebrates consisted of earthworms and other unrecognizable materials.

LOUIS S. KOHLER.

Bloomfield, N. J.

TWO BREWSTER'S WARBLERS AT LEONARDO, N. J.

On May 4, 1913, at Leonardo, Monmouth Co., New Jersey, two specimens of the *Helminthophila leucobronchialis* appeared among a small group of second growth maples near the northern end of the town between the New Jersey Central Railroad tracks and the seashore. The first of these birds to be seen was an adult male and differed slightly from the typical male of this species by having a small circular spot of clear yellow in the center of the breast about one-quarter of an inch in diameter. The wing bars were white as in the *H. chrysoptera* and the side, just below the middle of the wings, was washed with a faint but conspicuous yellowish tinge.

The second was also a male and differed very slightly from the typical male. In this specimen the yellow on the breast was replaced by a very faint tinge of black appearing under the surface of the feathers of the breast. These two birds were in company with fifteen or sixteen *Helminthophila chrysoptera* and were present about an hour, during which time they afforded excellent opportunities for observing them at close range, as they were very sociable and allowed me to approach within five or six feet of them before moving off to another branch of the saplings in which they were feeding.

LOUIS S. KOHLER.

Correspondence

MADISON, WIS., April 30, 1913.

DEAR FRIEND:—If you are interested in birds and desire to have your name included on our mailing list for future circular letters concerning the conservation of birds or appeals for advice with regard to same, will you kindly drop me a card?

1. Thanks to the coöperation of Professor I. N. Mitchell's observers as listed in the 1912 Arbor and Bird Day Annual, the Wisconsin Conservation Commission, Doctor T. S. Palmer, et al. of the U. S. Biological Survey, obtained January 9, 1913, President Taft's signature to an Executive Order creating Gravel Island Reservation, Wis. This includes Gravel and Spider Islands. An officer of the National Association of Audubon Societies anticipated us by getting an Executive Order, February 21, 1912, to create the Green Bay Reserve, otherwise known as Hog Island. About fourteen acres of unsurveyed islands are now permanent Federal reserves, breeding gulls and terns. Wisconsin still lacks state reservations. $150 will buy a gull rookery, Gull Island, edge of the Apostle Islands, Lake Superior, and $2000 will buy North Strawberry Island, opposite the state park in Door County. Who can help?

2. What other colonial birds are worthy of state protection? Where? Who owns land? The Biological Survey asks where black terns breed, but no information as to owner of such lands is at hand. What further legislation for Wisconsin? Are you ready for the question to remove all shore birds (*Limicolæ*) and hen-like birds (*Phasianidæ*), at least the Bob-white and Prairie Hen, to the non-game list because of greater value to agricultural interests. Bills for wild game propagation or conservation are faring poorly at the legisiature for lack of popular interest. If you don't want such bills, what seems to you better? The Biological Survey did work in Wisconsin last year so that in future more local information should be had. The Agricultural Appropriation Bill at Washington passed both Houses of Congress the month past and with it the migratory bird bill attached as a rider, now a law since March 9. Get a free copy through the U. S. Biol. Surv. This law means stopping of the southern slaughter of robins and smaller birds, we sincerely hope. It will probably prevent spring shooting in all states, although I have no authority for saying so.

3. Wisconsin was first to prohibit shooting for millinery (1887), among the first three to have salaried wardens (1887), of the first seven to prohibit spring shooting (1887), of the first eight to adopt the model law for protecting non-game birds (1901), of the first

eight to prohibit the sale of protected game (1903), fifteenth to obtain A Federal Bird Reserve (1912), although over fifty such reservations had been already created elsewhere in the United States, and though first in idea, yet of the first three to have a scientific summer school for game wardens (1912).

4. Wisconsin boasts the first thorough student of economic ornithology in the United States, the late F. H. King, Professor of Soils, Wisconsin University. The good work of Prof. S. A. Forbes of Illinois, began a year or two later than 1873, though published (1876) before King's work was out (1883), entombed in the state's four-volume work on "The Geology of Wisconsin."

5. Wisconsin's first close season for Prairie Chicken was in 1851. Since then, game laws have grown stricter, the non-game birds being removed from all molestation at all times, save by scientific permit. The quail should become a farm bird, since he eats about five pounds of insect pests and 9.75 pounds of weed seeds per year, a work valued from $10 to $20 a year per bird. Wisconsin's quail was being shot for game when it was most needed to help save the wheat crop from entire collapse in the chinch bug epidemic of the early seventies. A single quail has eaten 5000 chinch bugs at a meal.

6. The estimated annual insect loss for Wisconsin runs between $13,000,000 and $40,000,000. With this, link the value of birds and insectiverous mammals slaughtered in Wisconsin in 1912, $1,000,000. This figure decreases as the former increases. Already, our bird population is at least 20% less than it was.

I shall understad that no answer in the course of eight weeks will mean that you have no immediate suggestion.

A statement from me as to the possible moves that might be made in the progress of bird conservation, you will find in the newly issued Arbor and Bird Day Annual for 1913, obtained through the office of the State Superintendent of Schools.

Yours sincerely,

A. C. BURRILL,
Lecturer on Economic Relation of Birds.

Publications Reviewed

The Canadian Alpine Journal, Special Number, 1912. Published by The Alpine Club of Canada. Price one dollar.

This Journal takes the form of a report upon the Mammals, Reptiles and Batrachians, Birds, and Plants of The Alpine Club Expedition to the Mount Robson Region. The first four pages are devoted to the itinerary, a discussion of the life zones, and acknowledgements. Then follows the annotated list of species of Mammals covering about 38 pages, Reptiles and Batrachians, two pages; Birds, 28 pages; and Plants, 21 pages. The report upon the Birds is made by J. H. Riley, of the U. S. Smithsonian Institution. Seventy-seven species are here given. The Journal contains numerous excellent half-tones of specimens as well as scenery, and closes with a colored topographical map of the region under discussion. L. J.

Second Report of the Meriden (N. H.) Bird Club. 1912. With brief reports from other New Hampshire Clubs.

This report contains 17 half-tone figures and two maps, one of the Bird Sanctuary, known as the Allen Woodruff Smith Bird Sanctuary. It is a valuable treatise on the protection and care of birds, and should be in the hands of every one interested in bird protection. L. J.

The Practical Value of Birds. By Junius Henderson. University of Colorado Bulletin. Vol. XIII, No. 4. Boulder, Colo., April, 1913. 48 pp.

There is condensed in these 48 pages a wealth of material arranged in handy form. Judge Henderson will receive the hearty thanks of the large army of people who want to present facts in their arguments for the conservation of our birds. L. J.

Distribution and Migration of North American Herons and their Allies. By Wells W. Cooke, Assistant, Biological Survey. 1913.

The Flamingo and all of the Herodiones are treated in this Bulletin. The treatment of each species is accompanied with a map of America, and in each case the breeding range as well as the area in which the species occurs at any time is indicated. It would be impossible to speak too highly of the value of such maps of distribution. They show at a glance the exact status of the species without wading through a thicket of verbiage with the necessity of hunting up a general map in order to follow the description at all. L. J.

Fifty Common Birds of Farm and Orchard. Prepared in the Bureau of Biological Survey, Henry W. Henshaw, Chief. Farmers' Bulletin 513. 1913.

The fifty figures are from the pen of Louis Agassiz Fuertes, and all are colored. The mechanical work is for the most part good. This pamphlet is intended as a handy guide in the hands of the farmers, and besides the colored pictures contains much valuable information concerning the birds treated. L. J.

Birds of the Thomas County Forest Reserve. By John T. Zimmer, Nebraska Ornithologists' Union, Proceedings. April 14, 1913. Vol. V, Part 5.

This amounts to an ecological survey of the region of this Forest Reserve, as far as the birds are concerned. The two life zones treated are the sandhills of the Upper Sonora and the prairies of the Carolinian. Each zone is treated topically according to the character of the country, and the birds grouped under the several heads. Thus the birds are not treated according to their taxonomic relationships, but according to their habitat distribution. L. J.

A Revision of the Genus Chaemepelia. By W. E. Clyde Todd. Reprinted from the Annals of the Carnegie Museum. Vol. VIII, Nos. 3-4, 1913. Pp. 507-603.

This is a technical paper relating to the Ground Doves. A new genus, Eupelia, is here separated off from the one under discussion, and three new subspecies are described. The paper occupies almost a hundred pages and appears to be a thorough revision of this group of Ground Dove. L. J.

Cassinia. A Bird Annual. Proceedings of the Delaware Valley Ornithological Club of Philadelphia, 1912. Issued February, 1913.

The appearance of this annual upon our desk is always an inspiration. It is not merely the value of its contents, but the spirit of optimism which emanates from it. With an environment of an old settled country and a dense population, one who is favored by living in an open country might well question whether thre was anything in an open country might well question whether there was yet here is a thriving bird club, with a big city at it its center, and it is putting out every year the results of work of the first order. Long may it thrive and continue its work. L. J.

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